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16. Abstract

The goal of this study was to assess the effects of road runoff on freshwater mussels in North Carolina streams. We conducted our studies at 20 road crossings in the upper Neuse River Basin above Falls Lake as the study area. Using GIS, we selected 9 agricultural sites and 10 forested sites based on EPA landuse data. A 20th site was selected because of its urban nature and ongoing construction at the site. We surveyed mussels in the 300-meter reaches upstream and downstream of each of these crossings. We used the analysis of hemolymph obtained from the common mussel species *Elliptio complanata* as a non-lethal health assessment technique for studying the health of individual mussels upstream and downstream of these road crossings. Hemolymph analysis was also used to compare agricultural and forested sites. This project was the first field test of this hemolymph technique, and the forested sites were used to develop reference ranges for the various parameters evaluated in *E. complanata* hemolymph. Other health assessments included glycogen analysis, evaluation of the percent of gravid mussels at a site, and presence of parasites. Contaminants were measured in mussel tissue, sediment, and in Passive Sampling Devices (PSDs) deployed at each site.

There tended to be fewer mussels in the first 50 meters downstream of the road crossings; however, there were no differences when the entire 300-meter upstream and downstream reaches were considered. There was no difference in health parameters measured by hemolymph analysis between upstream and downstream mussels. Hemolymph glucose and calcium were significantly different between agricultural and forested sites. Hemolymph reference ranges are presented in this report. Contaminant analyses showed an increase in polycyclic aromatic hydrocarbons (PAHs), and some metals downstream of all road crossings at some sites. This appeared to be directly related to the number of vehicles crossing the bridges. There was, however, no direct correlation between increasing contaminant loads and decreasing mussel abundance. There were no noteworthy differences in contaminant loads between land use types. Passive sampling devices proved to be excellent surrogates for the direct measurement of PAHs in mussel tissue.

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